Project Controls Expo – 16th Nov 2017
Emirates Stadium, London

The Future of Project Controls –
Improve Project Performance using Big Data

Champions Suite

Session T5: 14:10 PM - 14:55 PM

About Martin van Vliet

Degree:

- Civil Engineering

Experience:

- Business Director, Cost Engineering Consultancy B.V.
- More than 20 years of industrial experience in consulting various industries such as Infrastructure, Energy, power, Mining, Chemicals, Construction and Pharmaceutical.

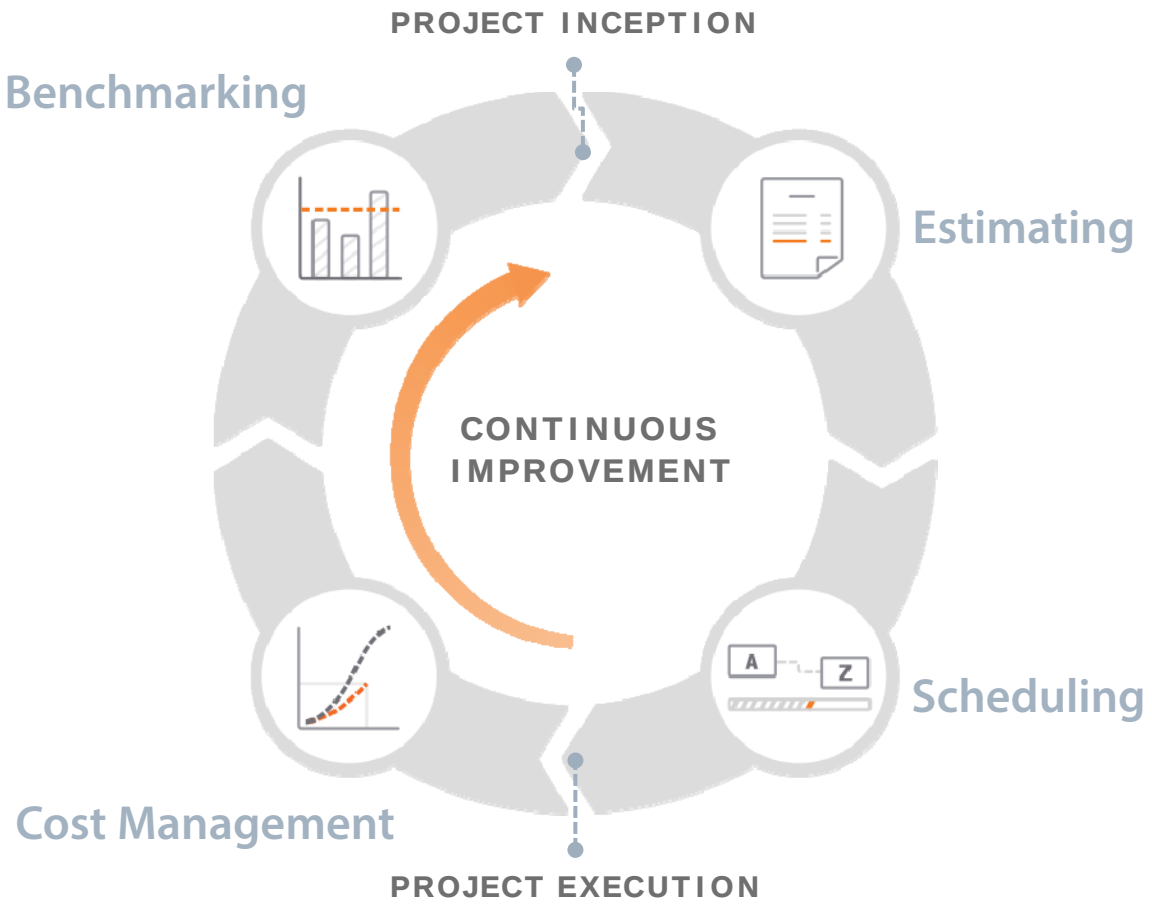
Professional Field:

- Member of the board of Cost Engineering Consultancy
- Member of NAP/DACE, AACEI, ICEC and AcostE
- Trainer of Cost Engineering courses

Cost Engineering Consultancy:

- Cost Engineering LinkedIn Group (> 16.000 members), Facebook, Twitter
- mvanvliet@costengineering.eu
- www.costengineering.eu & www.costmanagement.eu

Who is Cost Engineering?



- Consultancy
- Cleopatra Enterprise
- Education
- CESK

Project Controls EXPO

Agenda Outline

- How are we controlling projects?
- Root causes of overruns and delays
- Why do we need an Integrated Project Controls Process?
- Bottlenecks in establishing an Integrated Project Controls organization (IPC)
- Project Benchmarking Big Data - The road ahead

Objectives

- Why is it important to see project controls as an integrated approach, instead of a collection of individual disciplines?
- What are the most common pitfalls in integrating estimating, planning, cost management and benchmarking? How to avoid them?
- How can your organization achieve an integrated project controls process?
- How to improve investment decisions & strategies

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How are we controlling projects?

Additional **$1.8B** for World Trade Center Hub

The monumental train station, has almost doubled in cost from **$2B to $3.8B** and grown from a **4-year** to a **6-year** undertaking.

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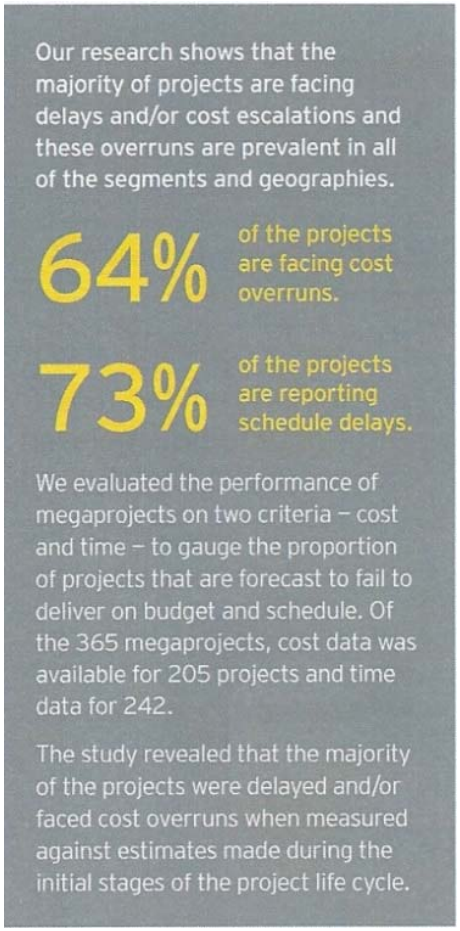
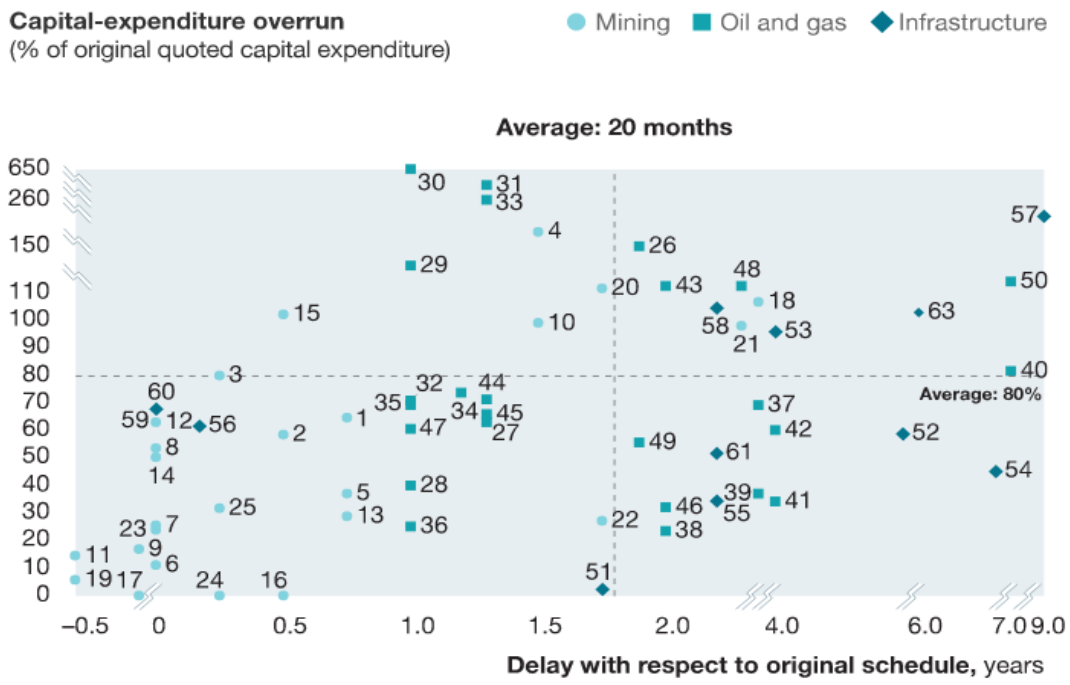
How are we controlling projects?

- Ernst & Young study (2014)
  - 365 megaprojects
  - Overruns and schedule delays found on all types of projects



How are we controlling projects?

Ninety-eight percent of megaprojects face cost overruns or delays.



- **98% of projects** incur cost overruns or delays.
- The average **cost increase is 80%** of original value.
- The average **slippage is 20 months** behind original schedule.

Source: McKinsey – The Construction Productivity Imperative (2015) (http://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/the-construction-productivity-imperative)

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Root causes of overruns and delays

Inadequate Communication and Slow Decision Making

Ambiguous Contract Terms and Lack of Incentives to Control Costs

Poor Risk Identification, Management and Response Strategy

Design Errors and Omissions Leading to Scope Growth and/or Rework

Poor Project Controls (Cost & Schedule)

Insufficient Planning and Inaccurate Estimating

Ineffective Project Governance, Management and Oversight

Late Design/Poor Project Definition

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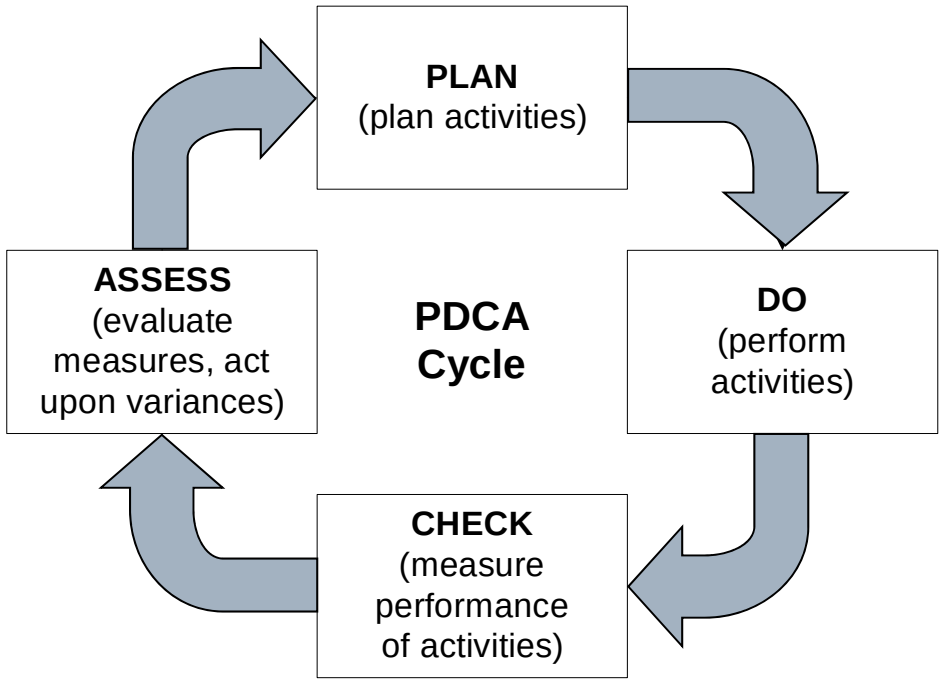
Continuous Improvement



Continuous Process

Every process uses feedback and improvement!

Integrated

Every process has P, D, C & A steps, which are linked to the business strategy!

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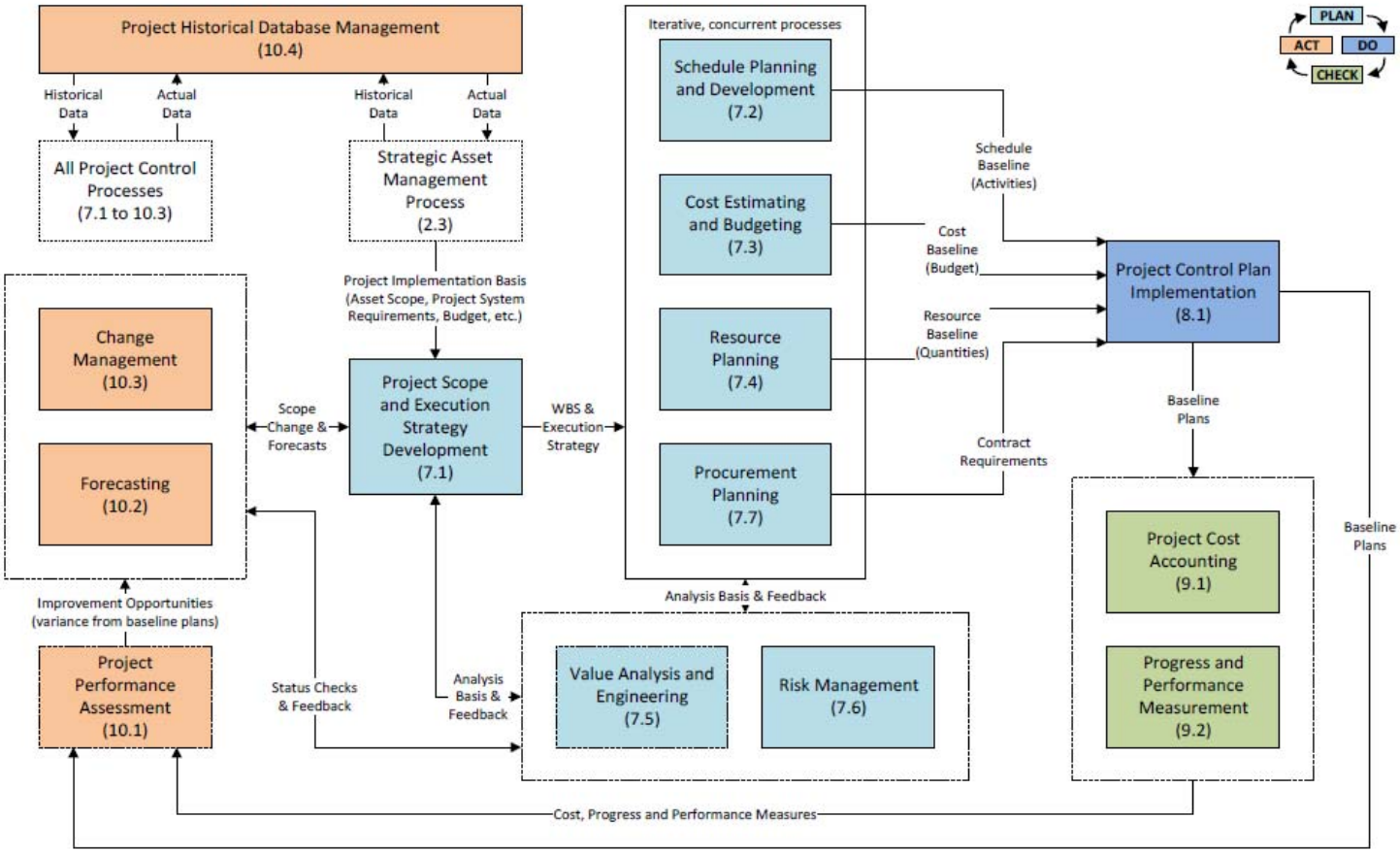
Integrated Project Controls Process



Ref: Total Cost Management Framework, 2nd Edition, Copyright © AACE® International

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Bottlenecks

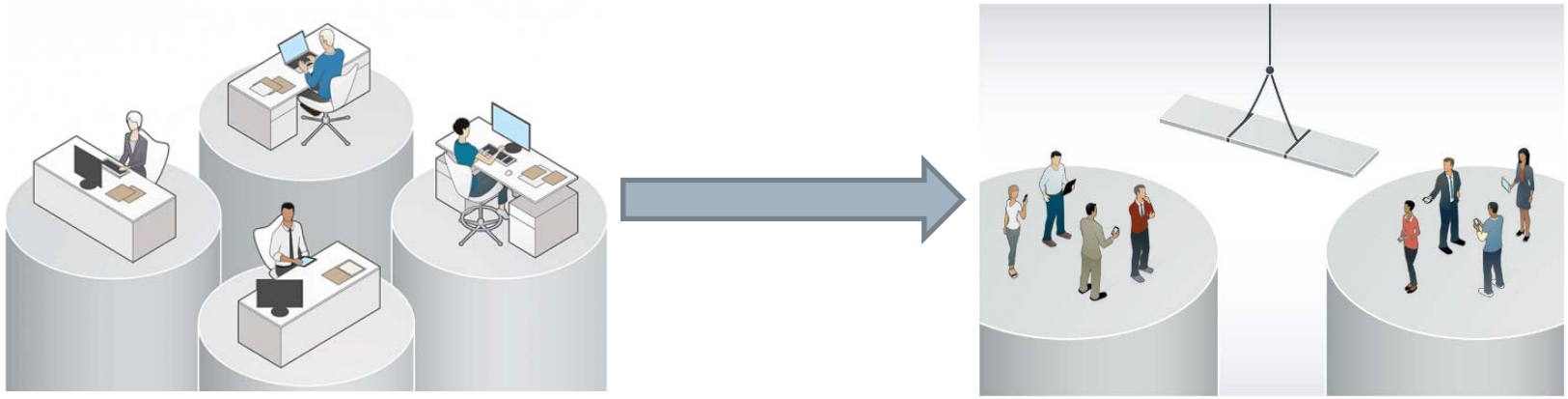
- Disciplines treated as individual silos
- Different departments responsible for their own ‘shop’
- No ‘standardized breakdown structures’
- Recasting of estimates
- No consistent close-out at the end of projects
- The human element
- No alignment between software tools

Disciplines treated as individual silos

- Little understanding of each other's requirements
- Miscommunication due to lack of common terminology and methods
- Silos can exist even within disciplines (eg. conceptual vs. detail estimating)
- Results in lots of rework and inefficiency

Departments responsible for own ‘shop’

- No shared responsibility for the success of projects
- Easy to point to others when projects exceed their budget/schedule
- The infamous ‘over-the-wall syndrome’



No standard breakdown structures

- Many organizations have no common breakdown structure across projects
- Difficult to compare apples with apples
- Required to enable consistency and feedback loop

100A965	100	7200	10
Project ID	WBS Code	COA	Cost Element

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Recasting estimates

- One of the most difficult areas of IPC
- Cost estimating and cost control are performed at different levels of detail
- Takes interaction to find best approach
- Breakdown structures can again play a facilitating role

No consistent close-out at end of project

- Everyone knows it is important, yet few organizations do it properly
- This is where lessons learned can be used to improve succes of future projects
- The missing link between actual costs and hours spent and early phase estimates

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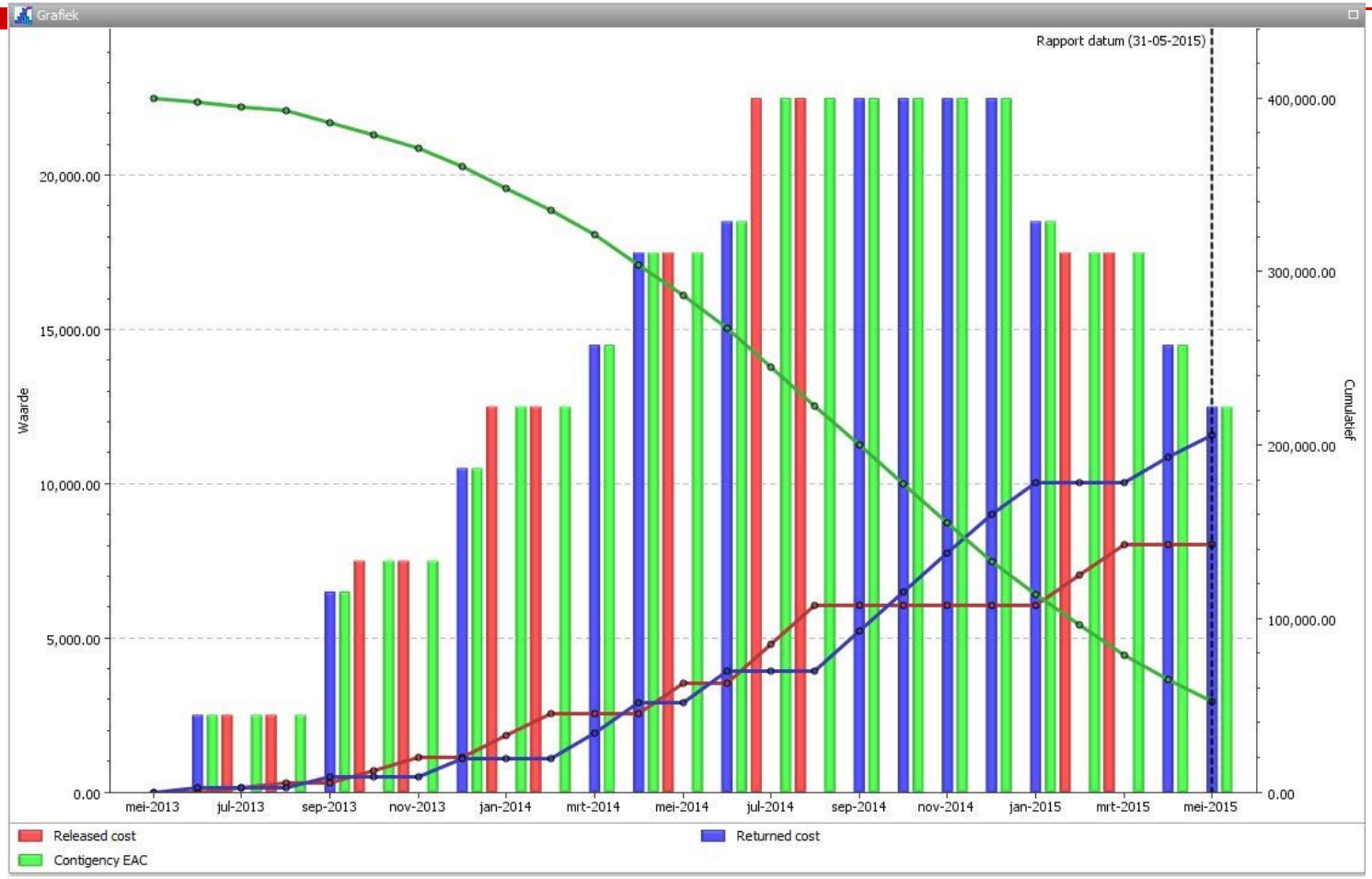
How much contingency did we use?



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Project close-out

"It was a good project. It will be missed"

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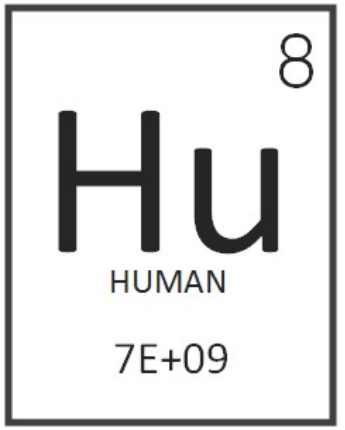
The human element

- People like to do what they know and what they are good at
- People are resistant to change, even when they know it can benefit them in the long run
- “If it’s not my responsibility, I don’t care”

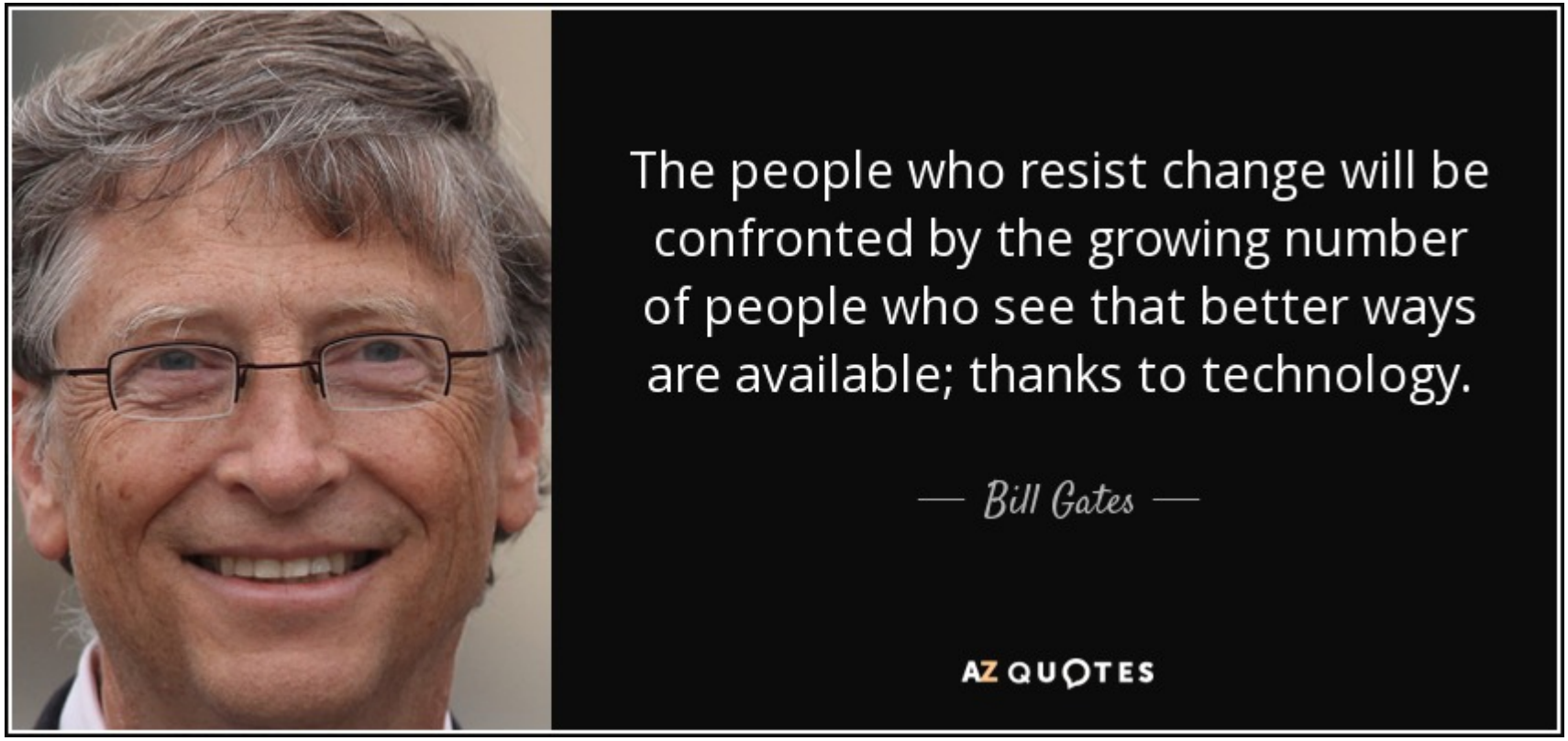


Alignement between software tools

- Different software tools for estimating, cost control and benchmarking (often Excel sheets…)
  - Often lacking integration
  - Lots of time and effort required to exchange information
  - Difficult to build-up a strong knowledgebase

Alignement between software tools

- Today's technology can enable organizations to integrate their processes more easily allow for:
  - Direct integration for easy exchanges of data
  - Consistent reporting for multiple stakeholders
  - Less manual data handling
  - Act as a central knowledgebase for cost and labour norms, metrics, key quantities and big data analysis



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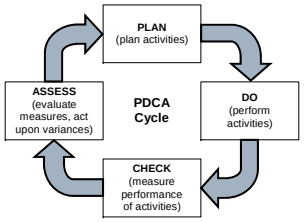
Integrated Project Controls



PROJECT INCEPTION

Benchmarking

Estimating

CONTINUOUS
IMPROVEMENT

Cost Management

Scheduling

PROJECT EXECUTION

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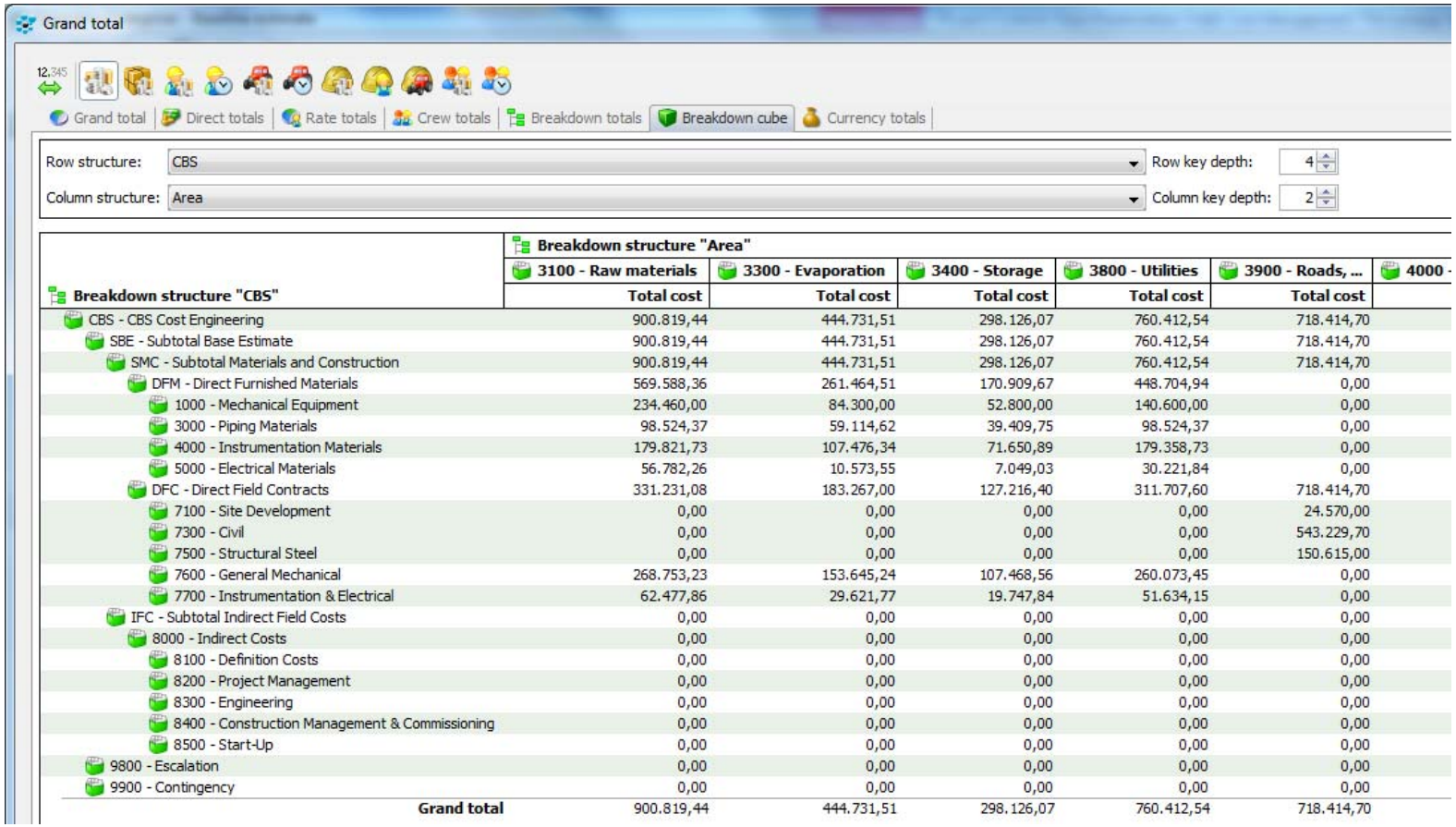
Integrated Project Controls Process

Software systems support an integrated approach.
As a result, maximum project performance can be achieved.

- Setting up a transparent **Cost Baseline** which meets stakeholder requirements.
- **Monitoring** of project costs and planning during execution
- Visualize performance indicators / **KPIs**
- Provide improved forecasting information
- Perform **Big Data analysis** to retrieve meaningful ratios and metrics from projects to **Benchmark** and calibrate estimating data.

Estimating the Cost Baseline Breakdown Structures



Breakdown structure "CBS"	Breakdown structure "Area"					
	3100 - Raw materials	3300 - Evaporation	3400 - Storage	3800 - Utilities	3900 - Roads, ...	4000 -
	Total cost	Total cost	Total cost	Total cost	Total cost	
CBS - CBS Cost Engineering	900.819,44	444.731,51	298.126,07	760.412,54	718.414,70	
SBE - Subtotal Base Estimate	900.819,44	444.731,51	298.126,07	760.412,54	718.414,70	
SMC - Subtotal Materials and Construction	900.819,44	444.731,51	298.126,07	760.412,54	718.414,70	
DFM - Direct Furnished Materials	569.588,36	261.464,51	170.909,67	448.704,94	0,00	
1000 - Mechanical Equipment	234.460,00	84.300,00	52.800,00	140.600,00	0,00	
3000 - Piping Materials	98.524,37	59.114,62	39.409,75	98.524,37	0,00	
4000 - Instrumentation Materials	179.821,73	107.476,34	71.650,89	179.358,73	0,00	
5000 - Electrical Materials	56.782,26	10.573,55	7.049,03	30.221,84	0,00	
DFC - Direct Field Contracts	331.231,08	183.267,00	127.216,40	311.707,60	718.414,70	
7100 - Site Development	0,00	0,00	0,00	0,00	24.570,00	
7300 - Civil	0,00	0,00	0,00	0,00	543.229,70	
7500 - Structural Steel	0,00	0,00	0,00	0,00	150.615,00	
7600 - General Mechanical	268.753,23	153.645,24	107.468,56	260.073,45	0,00	
7700 - Instrumentation & Electrical	62.477,86	29.621,77	19.747,84	51.634,15	0,00	
IFC - Subtotal Indirect Field Costs	0,00	0,00	0,00	0,00	0,00	
8000 - Indirect Costs	0,00	0,00	0,00	0,00	0,00	
8100 - Definition Costs	0,00	0,00	0,00	0,00	0,00	
8200 - Project Management	0,00	0,00	0,00	0,00	0,00	
8300 - Engineering	0,00	0,00	0,00	0,00	0,00	
8400 - Construction Management & Commissioning	0,00	0,00	0,00	0,00	0,00	
8500 - Start-Up	0,00	0,00	0,00	0,00	0,00	
9800 - Escalation	0,00	0,00	0,00	0,00	0,00	
9900 - Contingency	0,00	0,00	0,00	0,00	0,00	
Grand total	900.819,44	444.731,51	298.126,07	760.412,54	718.414,70	

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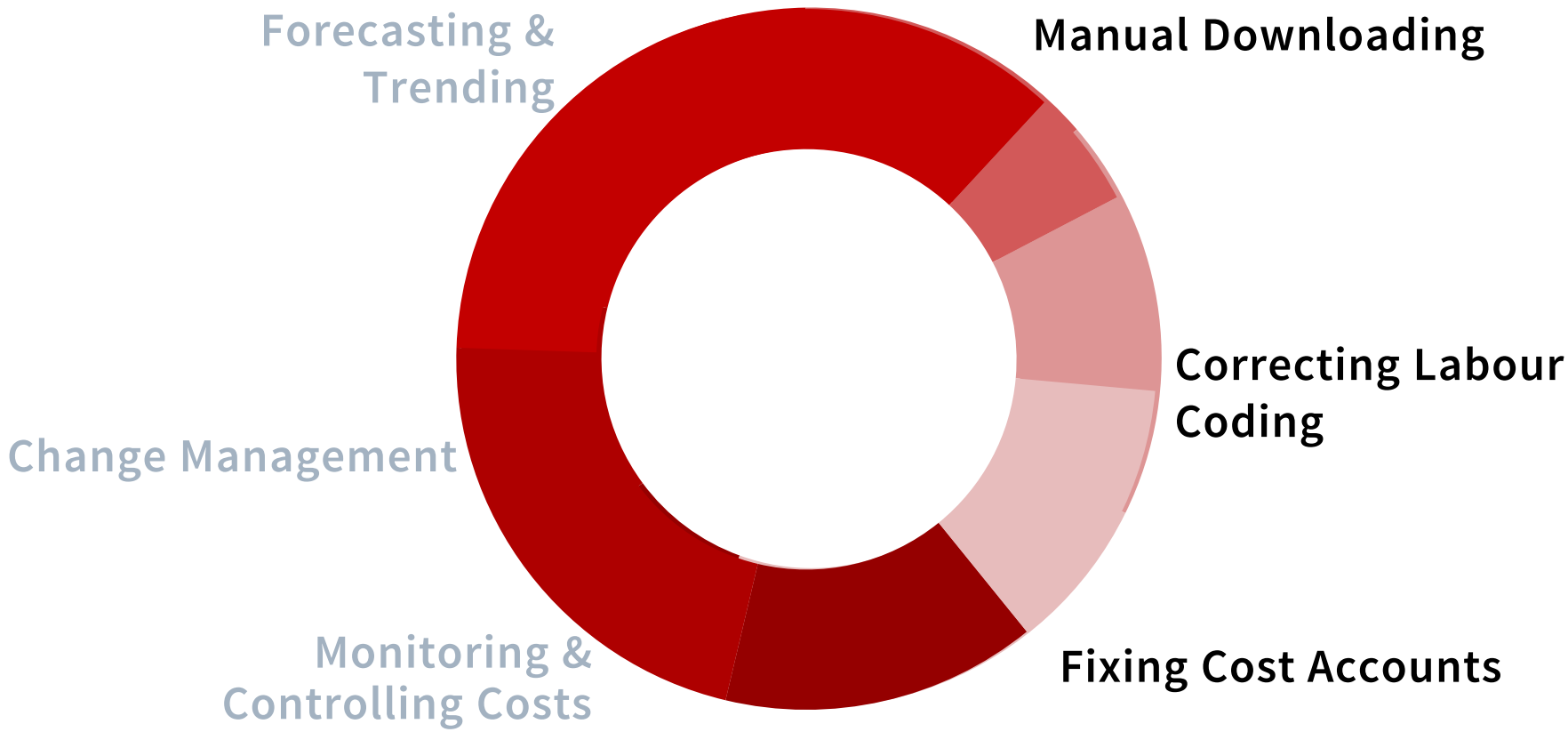
Spending valuable time on things that matter



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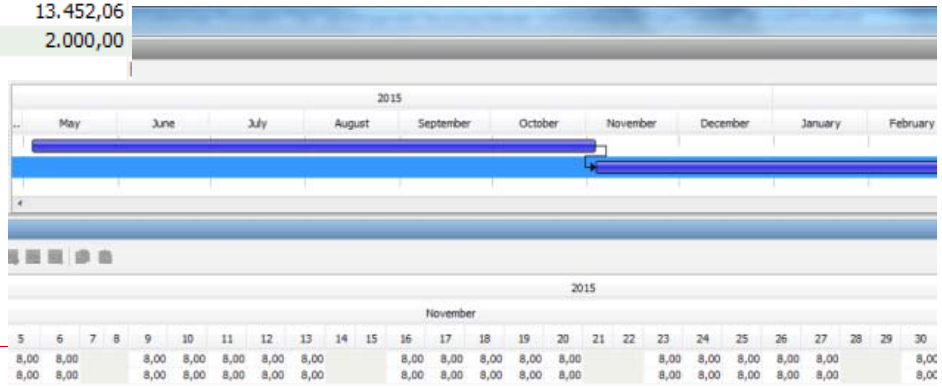
Forecast – the link with estimating

Keep link with estimating:

- Improved integration with estimate
- Keep the estimate alive
- Involvement of cost estimator in execution phase

EAC

	Description	Estimate link	Total cost	Cost
1	EAC		63.779,84	63.779,84
2	EAC components		55.808,25	55.808,25
3	CS Pipe materials 1/2"		13.452,06	13.452,06
4	CS Pipe materials 2"		13.452,06	13.452,06
5	CS Pipe materials 4"		13.452,06	13.452,06
6	CS Pipe materials 8"		13.452,06	13.452,06
7	Piping materials extra		2.000,00	2.000,00
8	Description			Cost



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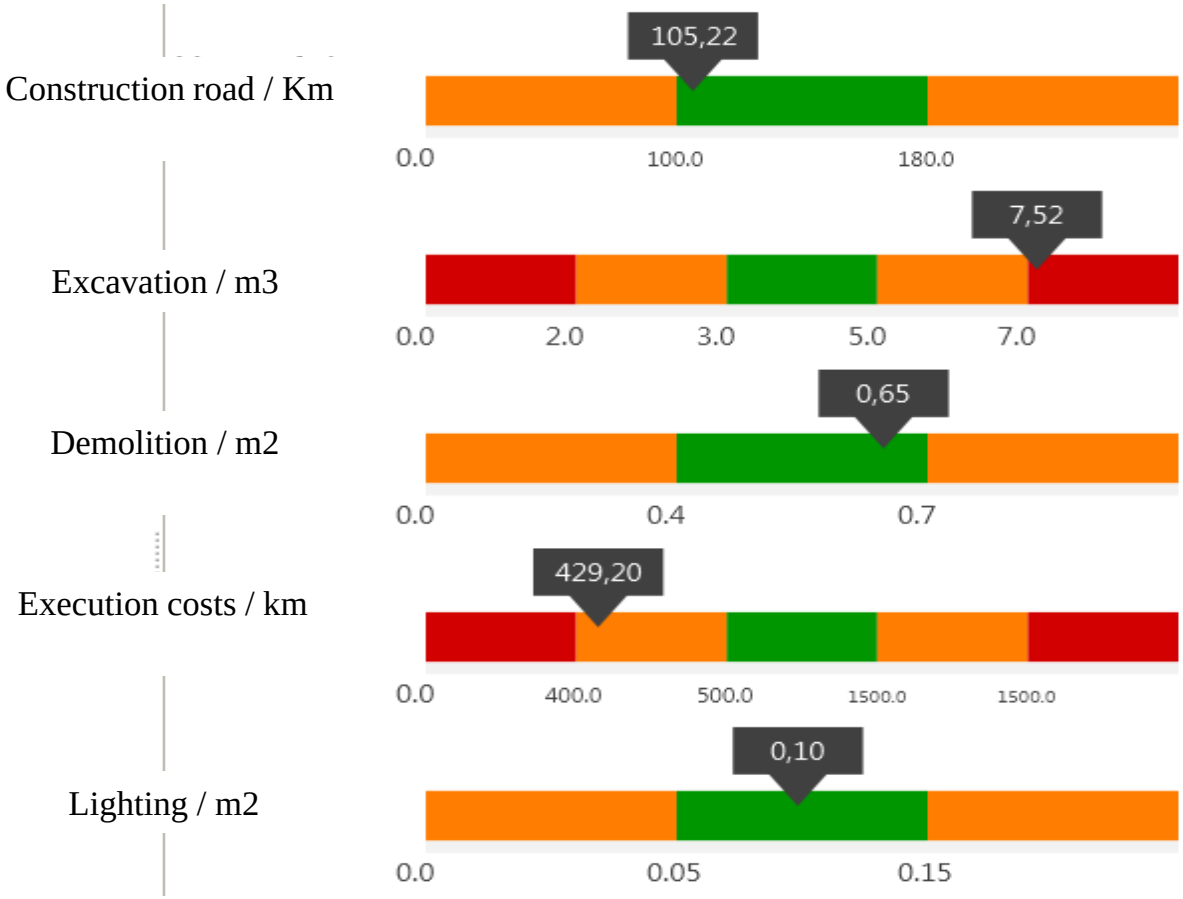
Monitor Project Control KPIs in Execution phase



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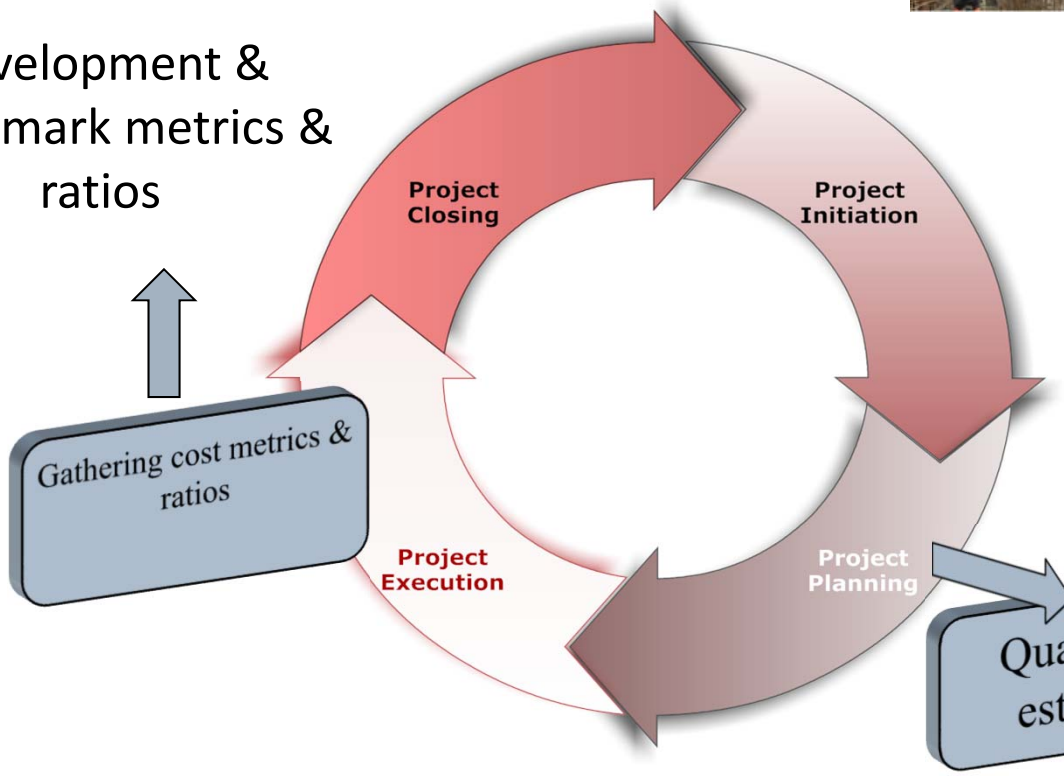
Project Feedback Loop

Development & Benchmark metrics & ratios



€ x Total costs / m2

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Project Benchmarking - Big Data

- Collect all historical projects
- Used for analysis to improve estimating
- Used for portfolio analysis on assets
- Derive metrics on asset level
- Normalization of benchmark data

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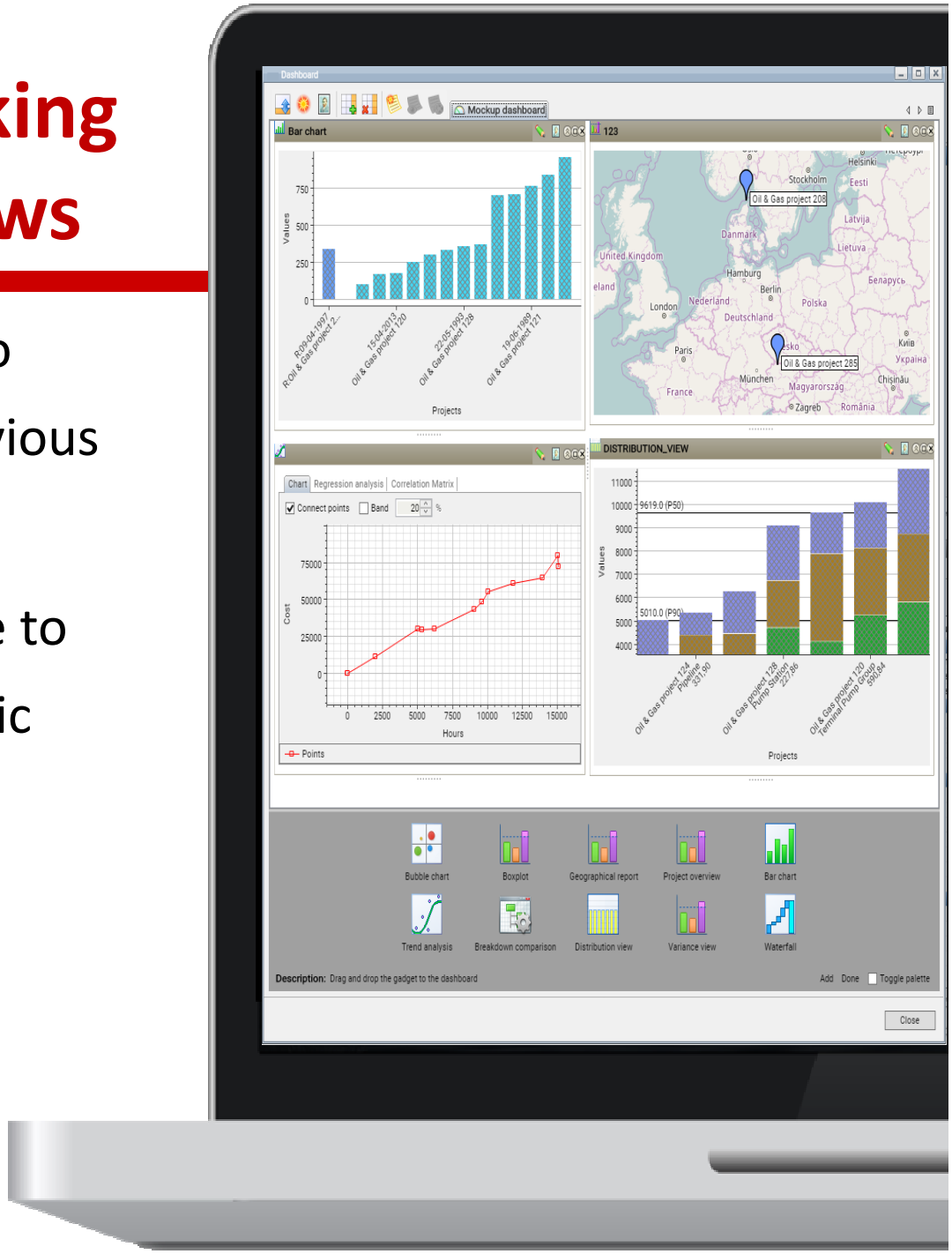
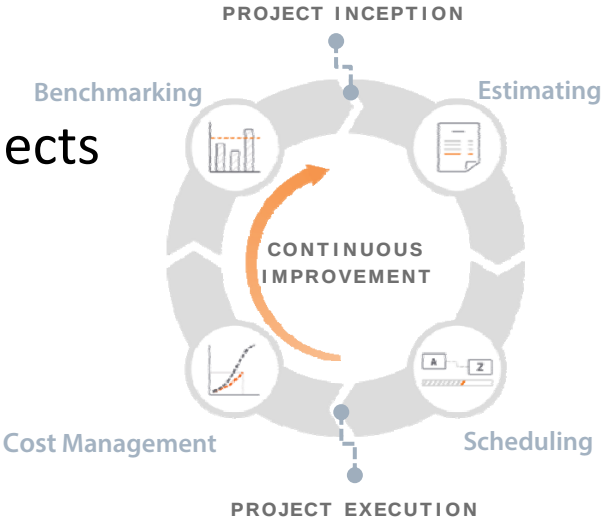
Project Benchmarking Management Views

- Dashboard allows you to combine any of the previous reports in one view
- Completely configurable to specific needs for specific audiences

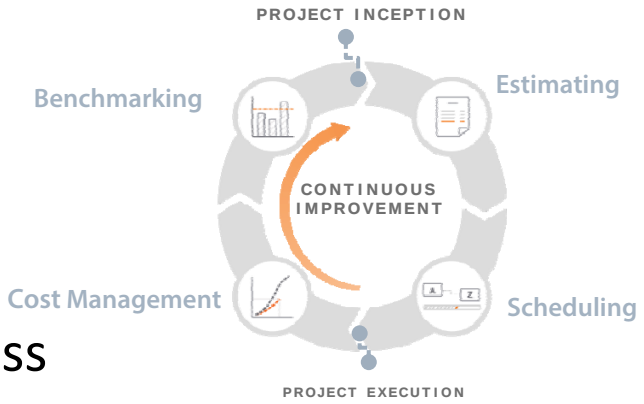


Conclusion

- Still a long way to go in successfully controlling projects
- Various challenges that need to be addressed:
  - Disciplines treated as individual silos
  - Different departments responsible for their own ‘shop’
  - No ‘standardized breakdown structures’
  - Recasting of estimates
  - No consistent close-out at the end of projects
  - The human factor
  - No alignment between software tools



Conclusion



- Organizations should assess their IPC process
- Significant improvements can be expected by increasing the level of IPC
  - More accurate and reliable (early phase) estimates
  - More time to focus on analysis
  - Increased profitability on projects through less overruns and more efficient work processes.
  - Ability to benchmark and perform big data analysis improves competitive outcomes, and provides companies in understanding their cost drivers and behaviours.